



A relict *Cladocora caespitosa* reef in Kalloni Gulf, Lesvos Island (N Aegean Sea): Mapping and present status

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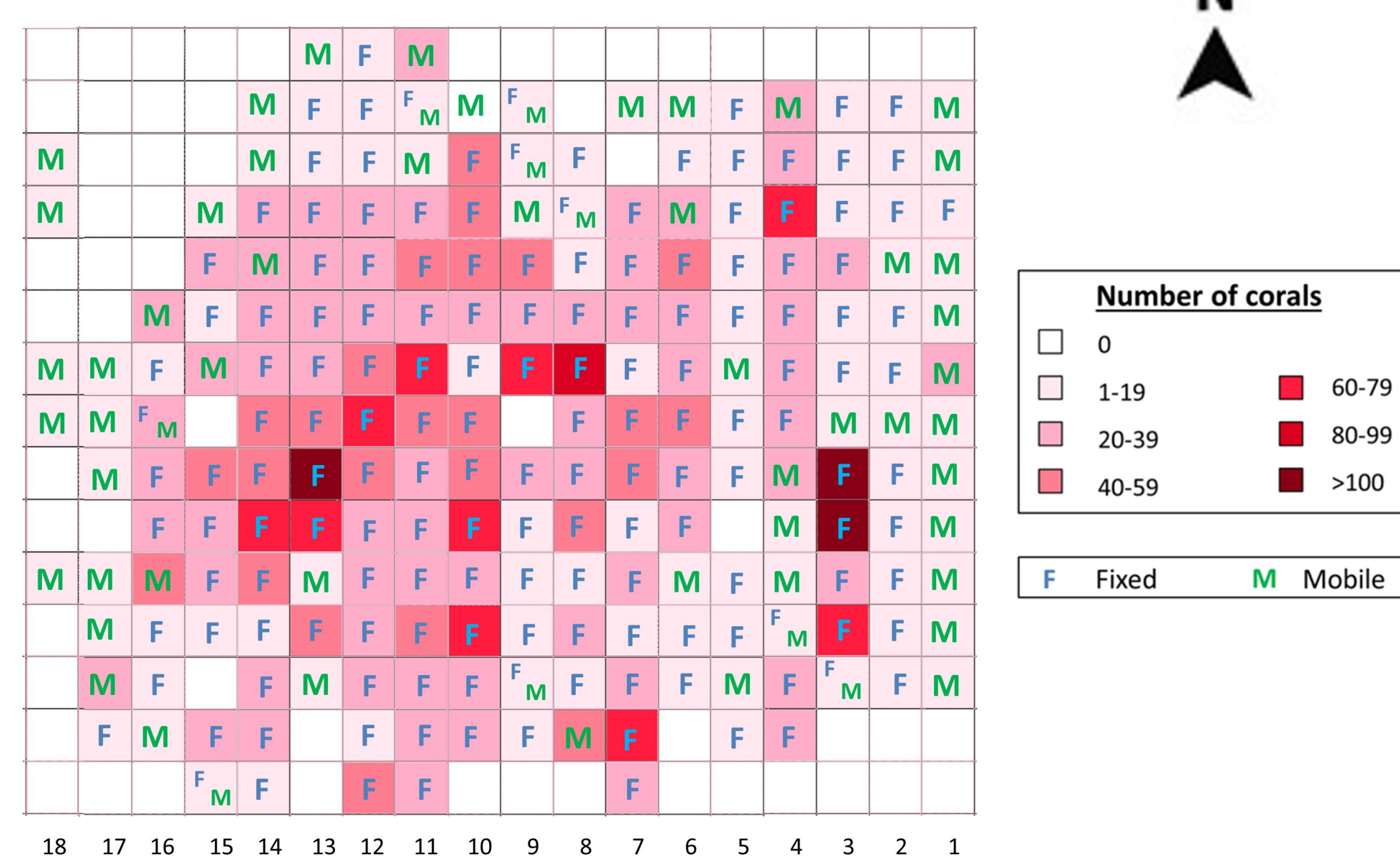
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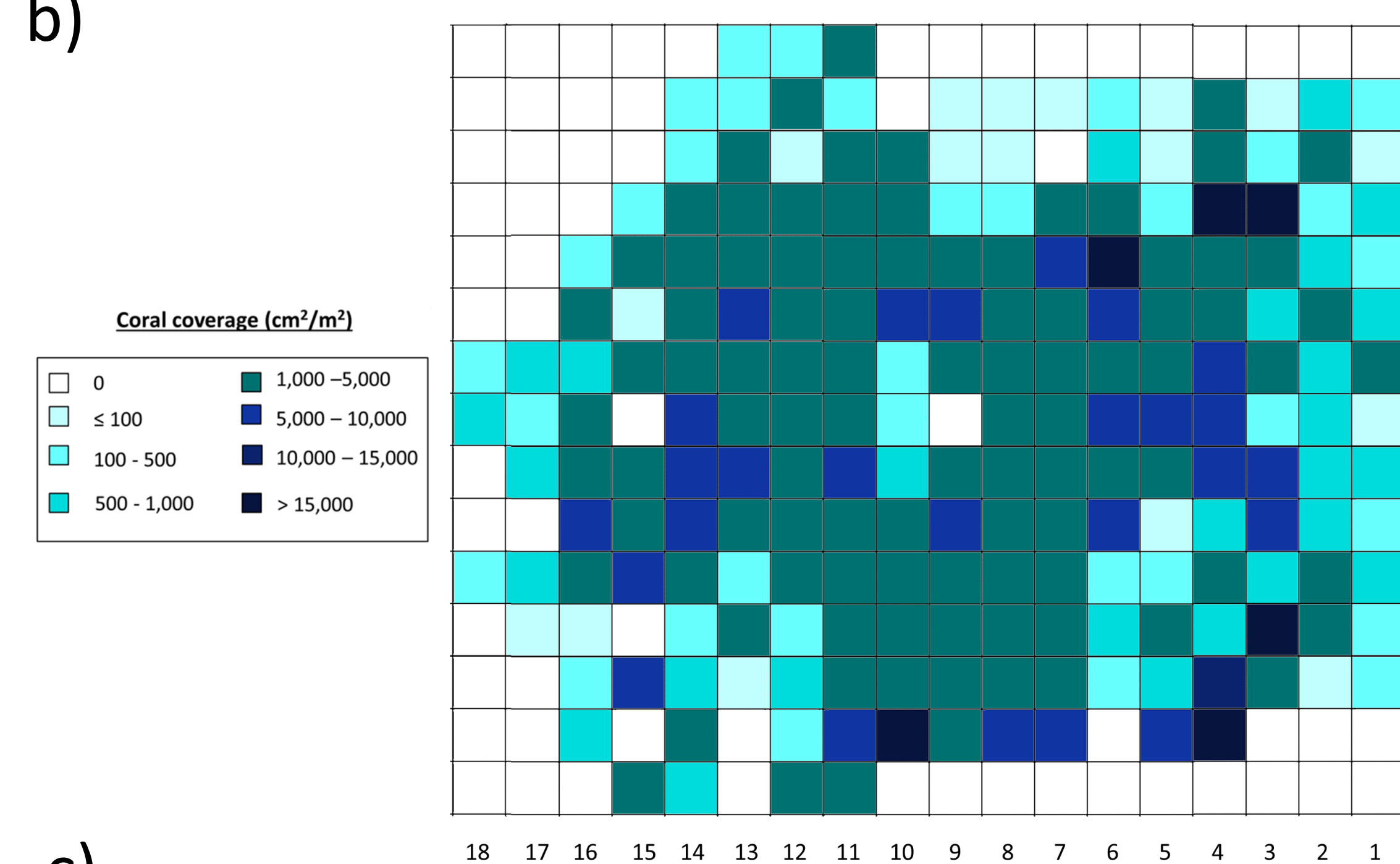
SCOPE

The colonial, zooxanthellate coral *Cladocora caespitosa* (Linnaeus, 1767) is the only Mediterranean endemic coral capable of building reefs. It can be found over a wide range of substratum types, depth zones (1-40 m) and hydrodynamic conditions. *C. caespitosa* colonies may exist as solitary, free-living coral nodules, or forming beds (dense populations of various small colonies), and even banks of various connected colonies covering several square meters and reaching up to 100 cm height (Monnier *et al.*, 2021). However, it has a very slow growth rate (2-5 mm/year), and large bioconstructions are rare in the Mediterranean. In 2015 *C. caespitosa* was classified as an endangered (EN) species by the IUCN Red List, due to its dramatic decrease over the last few decades (Casado de Amezuza *et al.*, 2015). The present study aimed to investigate a previously unknown *C. caespitosa* relict reef in the Gulf of Kalloni (Fig. 1), focusing primarily on the mapping of its spatial extent, and the assessment of its population structure and health status. Our work provides important reference data for future monitoring.

a)



b)



c)

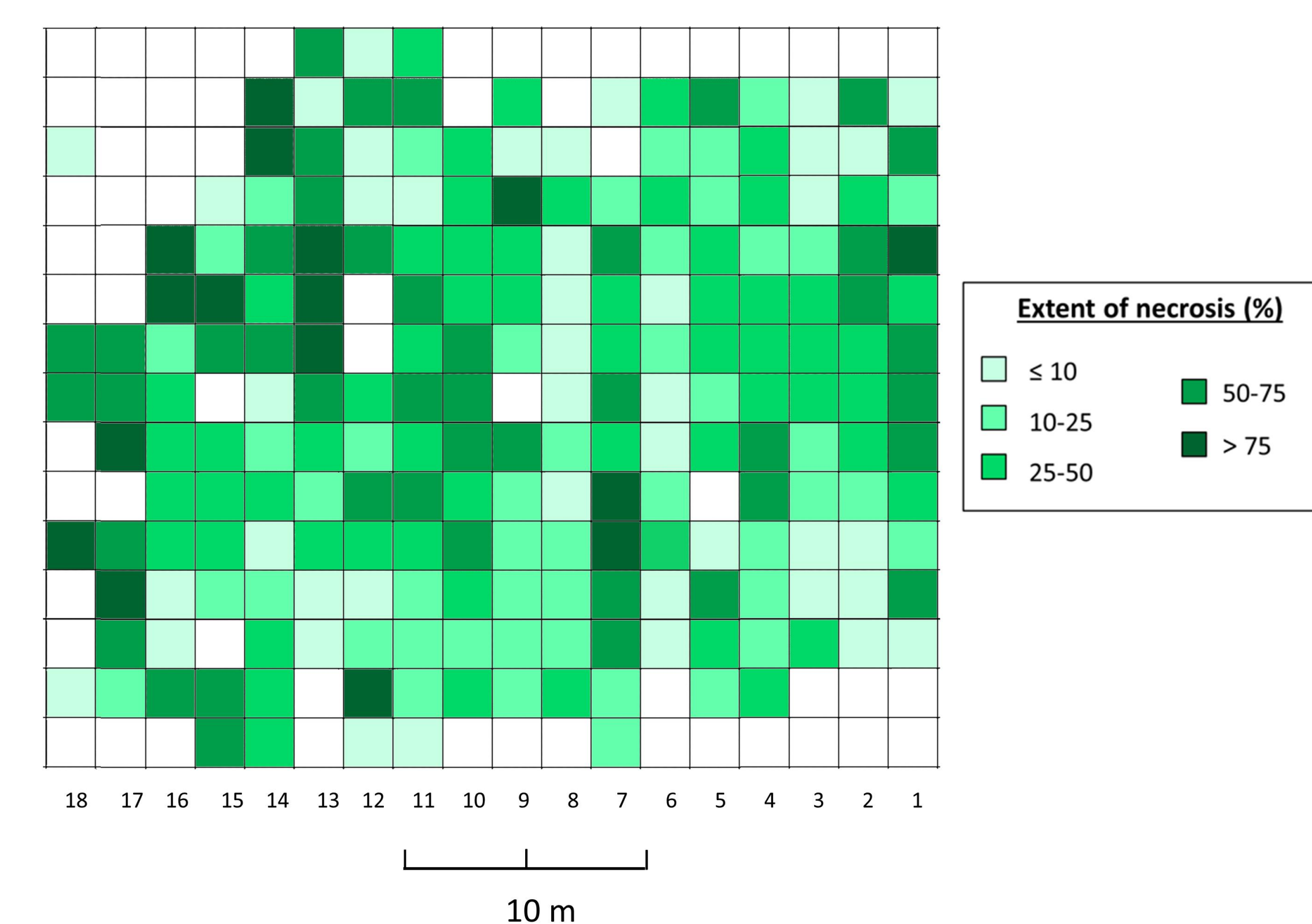


Figure 2. Map of the sampling 2x2 m segments at the *C. caespitosa* reef displaying a) colony abundance and association to the substrate (i.e. fixed or mobile), b) colony area cover, c) mean extent of necrosis (%).

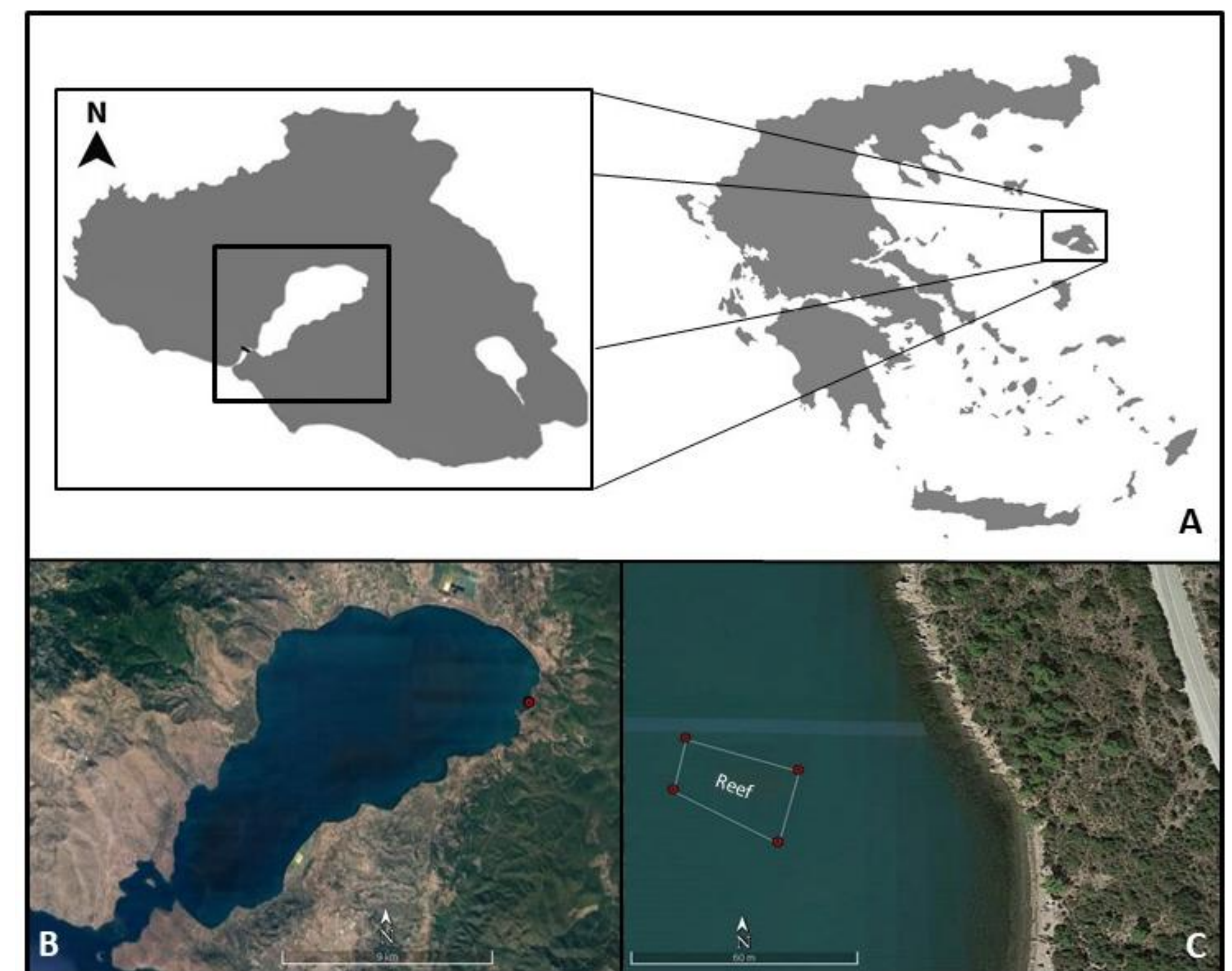


Figure 1. Map of Lesvos Island, Kalloni Gulf and the location of the reef.

METHODS

- SCUBA diving visual surveys were carried out during May and June 2022 at 0-5.8 m depth.
- An area of 36x30 m, including the core of the *C. caespitosa* reef along with scattered colonies in the immediate surroundings, was delimited and divided into 2x2 m segments using ropes.
- In each segment, sampling was carried out using a 1 m² quadrat frame, in order to record: maximum size of the major colony axis (D1), maximum size of the minor colony axis (D2), extent of necrosis per colony (%), association of each colony to the substrate (fixed or mobile), and total number of colonies. Based on the aforementioned data, colony density and coverage (%) were also calculated.
- Heatmaps of coral abundance, coral coverage and necrosis were produced (Fig. 2).

RESULTS

- **Colony density:** 4.79±2.25 colonies/m² (Fig. 2a).
- **Colony size (based on D1):** 22.52±18.81 cm, with the majority of colonies being <30 cm (Fig. 3).
- **Colony cover:** 449.5±1134.0 cm², with prevailing values between 1000 and 5000 cm²/m² (Fig. 2b).
- **Extent of necrosis:** among the necrosed colonies, an average necrosis of 33.6±38.1% was recorded. 50% of the colonies were considered as healthy (i.e. ≤10% of colony necrosed). Severe necrosis tended to be more common in the westernmost and easternmost sites of the study area (Fig. 2c; Fig. 4).

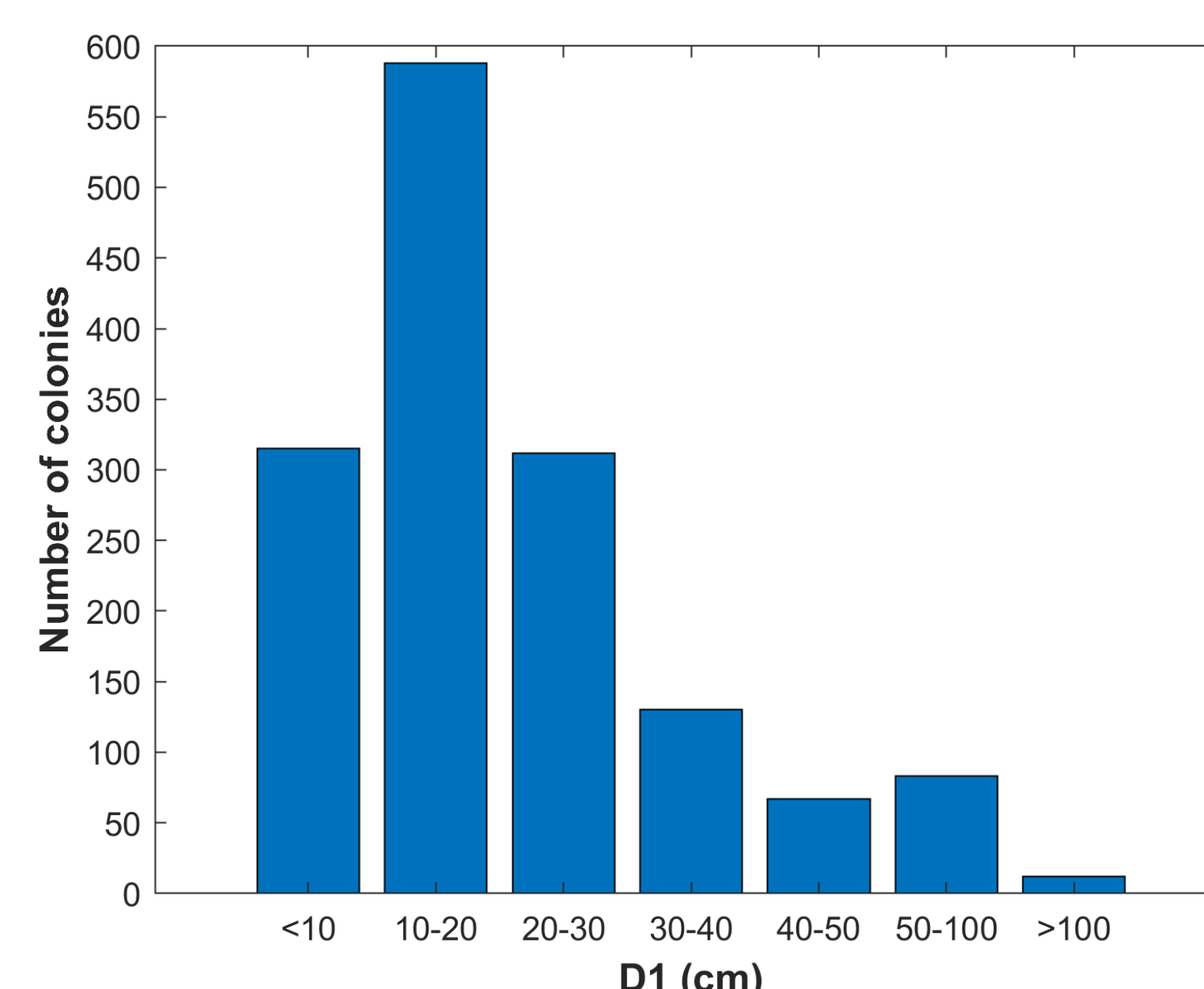


Figure 3. Size frequency distribution of *C. caespitosa* colonies based on the major colony axis (D1).



Figure 4. A *C. caespitosa* colony showing partial necrosis.

DISCUSSION

In terms of morphological structure, the relict *C. caespitosa* reef of Kalloni Gulf can be characterised as a coral bank (Monnier *et al.*, 2021). It is the third *C. caespitosa* reef reported in the Aegean Sea, and is among the most extensive ones in the whole Mediterranean Sea. Overall, the coral population suffers a moderate mortality status (Garrabou *et al.*, 2022), and compared to reefs in other parts of the Mediterranean (Kersting *et al.*, 2013; De Biasi *et al.*, 2021) the Kalloni bank appears to be in a better condition. The uniqueness of this relict bank highlights the need for further search of other *C. caespitosa* bioconstructions within the Kalloni Gulf, and requires the adoption of effective conservation measures and relevant restoration actions to safeguard its survival.

REFERENCES

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